Pierce Transit is the major public transportation provider for Seattle and Tacoma, WA.

PIERCE TRANSIT:

THE FUTURE IS CLEAR: A 100% CNG FLEET

Public transportation agency Pierce Transit has a clear plan for the future of its bus fleet. By 2005, the Tacoma Washington-based agency intends to operate only buses that run solely on compressed natural gas (CNG).

Cummins Westport's low-emission natural gas engine, the C Gas Plus, has become the engine-of-choice for Pierce Transit. In 2002 the agency purchased 38 New Flyer low-floor, 40- foot buses, powered by the Cummins Westport C Gas Plus engine. This 8.3-liter spark-ignited natural gas engine has proven to be the most technologically advanced, durable and cost-effective natural gas engine in the Agency's fleet. "The C Gas Plus is head-and-shoulders above the other natural gas engines in our fleet," says Ron Shipley, VP Maintenance for Pierce Transit.

Pierce Transit was an early convert to compressed natural gas buses. In 1986, the Agency modified two 1974 GMC buses to run on diesel and compressed natural gas. From that early demonstration, the transit agency saw the benefits of natural gas as a vehicular fuel, and continuously purchased dedicated CNG buses as aging diesel buses needed replacing.

Performance

Having managed the CNG bus fleet since 1987, Shipley speaks with experience on how the natural gas engines have advanced from the early GMC conversions to the state-of-the-art C Gas Plus-powered buses. "Early on there were some power issues, but with the new natural gas buses, power is not an issue."

With the C Gas Plus-powered buses, Shipley has seen notable improvements in performance. The regulator drifting (sometimes found in older model CNG buses) has become "ancient history" says Shipley, oil consumption is reduced due to the new ring/piston packages, and there is better idling and longer intervals between road calls.

Pierce Transit operates natural gas buses that have traveled over 400,000 miles before needing a major engine overhaul. "At the current rate of wear, our agency doesn't anticipate the need to rebuild these engines until they have at least 500,000 miles on them."

The C Gas Plus-powered buses have won fans with the toughest audiences – service technicians and drivers. "The technicians definitely notice the buses are more controlled," says Shipley. An innovative feature of the C Gas Plus engine is the electronic control module (ECM). Derived from the Cummins Interact System for engine management, the ECM makes the engine compatible with Cummins diesel diagnostic tools for troubleshooting repairs. As for the drivers, "They are hard on buses," says Shipley, "but they are satisfied with the performance of the natural gas buses."

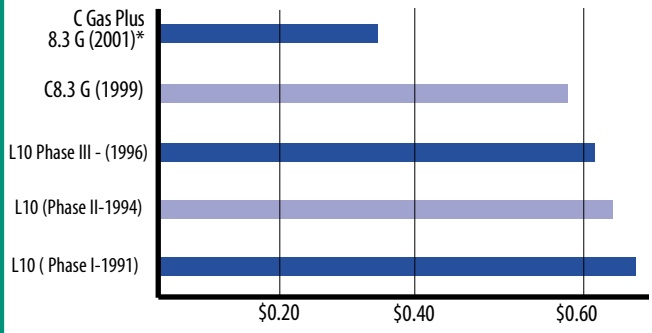
The local Cummins distributor, Cummins Northwest, provides technical support to ensure the fleet runs smoothly. "Cummins Northwest is critical to our program's success and provides excellent support for our service team," says Shipley.

In terms of operating costs, Shipley is seeing the cost per mile decrease as CNG engine technology advances. He calculates that in 2002 operating costs for maintenance (repairs, inspections, cleaning, and rebuilding), fuels and lubricants equaled $0.36 per mile for the C Gas Plus buses. By comparison, older natural gas engines (introduced in 1990) cost $0.66 per mile to operate.

FLEET SNAPSHOT

- Total fleet size: 235 buses
- Total natural gas-powered buses: 176
- Total ridership: 15.2 million
- Average miles traveled per natural gas bus: 4,500/month
- Average range (C Gas Plus-powered bus): 350 miles
- Percentage reduction in noise (C Gas Plus natural gas engines versus newest comparable diesel engine): 14%
- Operating cost/mile (C Gas Plus-powered buses): $.36/mile

PIERCE TRANSIT CNG FLEET: OPERATING COST/MILE



** Year engine was first introduced into the Pierce Transit fleet*

C Gas Plus-powered buses cost $0.36/mile to operate in the Pierce Transit fleet – nearly 1/2 the cost of early model CNG engines.

MAINTENANCE/FACILITY UPGRADES

In 1994 Pierce Transit retained a firm to assess the costs to upgrade its buildings to accommodate a natural gas fleet. After the proposed budget came back at $3 million – a prohibitive price tag for Pierce Transit – the Agency set out to design a simpler and safer solution.

The Agency added natural gas sensors to its maintenance facilities and modified its ventilation system at a cost of nearly $600,000. Shipley explains that the agency's facility is divided into zones, and when a sensor detects methane, fans immediately turn on to add air into the affected zone. If the sensors continue to detect a problem, the doors automatically go up and the electricity shuts down. Shipley says that since they upgraded the facility, the shutdown has never been triggered. "It's a safe and worry-free system."

"The C Gas Plus is head-and-shoulders above the other natural gas engines in our fleet."

In terms of refueling, after the initial station was installed in 1989 at a cost of approximately $600,00, Pierce Transit added a fast-fill compressor station in 1992, capable of refueling three CNG buses simultaneously in less than 10 minutes (a similar speed to fueling a diesel-powered bus), at a cost of about $850,000. In 2000, a third fast-fill compressor was added to the station, costing approximately $880,000.

EMISSIONS

Shipley refers to the natural gas buses as, "our lean, green, clean machines." The C Gas Plus natural gas engine is certified to emit 28 percent less oxides of nitrogen and non-methane hydrocarbons than the ceilings established by the US Environmental Protection Agency. Natural gas buses emit virtually no particulate matter (PM), a harmful component of air pollution that penetrates deeply into the lungs. "We know natural gas is a clean fuel, and we know what it can do," says Shipley. "And there's about five or six more things that can be done to clean up natural gas engines even further."

Ron Shipley, VP Maintenance for Pierce Transit, says they will be running a 100% CNG bus fleet before 2005.

ABUNDANT, CLEANER FUEL

Shipley believes in the importance of relying on an cleaner, domestic fuel source. "I've lived through two oil crisis already. Using natural gas is better for the environment and a lot more secure."

Pierce Transit's experience with CNG buses shows that corporate citizenship and bottom-line efficiency can co-exist. "We're using taxpayer's dollars to shift away from a petroleum-based society. I think that's a very important business decision."

THE C GAS PLUS

FEATURES OF THE CUMMINS WESTPORT C GAS PLUS 8.3-LITER NATURAL GAS ENGINE:

- STATE-OF-THE-ART ELECTRONIC CONTROLS AND DIAGNOSTIC SOFTWARE
- ELECTRONIC THROTTLE (DRIVE-BY-WIRE) IMPROVES THROTTLE RESPONSE
- LEAN BURN TECHNOLOGY OFFERS BETTER FUEL EFFICIENCY AND LOWER EMISSIONS
- PROVEN ENGINE DESIGN - BASED ON THE CUMMINS DIESEL PLATFORM
- CERTIFIED TO **CARB ULEV** AND OPTIONAL LOW **NOx, EPA 2004, EURO III**
- LIGHTWEIGHT - UP TO **900** LBS LIGHTER THAN COMPARABLE **CNG** ENGINES

For more information about Cummins Westport natural gas engines, call 604-718-2000.
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Cummins Westport